

What is claimed is:

1. A method of regulating or controlling a cyclically (20; 30) operating internal combustion engine (1) using a computation model by which the cycle (20; 30) or portions of the cycle (20; 30) of the internal combustion engine (1) is, or are, divided into individual parts (21 through 28; 31 through 38) and the operating condition within each cycle part (21 through 28; 31 through 38) is determined using measured values, stored and/or applied data in order to obtain actuating variables for operating said internal combustion engine, wherein the computation models for the various individual cycle parts (21 through 28; 31 through 38) are based on at least partially different assumptions and/or have different simplifications and that the time limits of the cycle parts (21 through 28; 31 through 38) are at least partially calculated as a function of at least one variable engine operating parameter.
2. The method according to claim 1, wherein computation models for the individual cycle parts (21 through 28; 31 through 38) evolve from an initial condition and algebraically calculate in one step computation variables during duration of the cycle part.
3. The method according to claim 1 or 2, wherein at least one limit of at least one cycle part (22 through 28; 34 through 38) is defined by the position of the intake and/or exhaust valves (7, 8).
4. The method according to any of the claims 1 through 3, wherein at least one cycle part (21; 31, 32, 33) is defined by the preferably completely open condition of the intake and exhaust valves (7, 8).
5. The method according to any of the claims 1 through 4, wherein at least one limit of at least one cycle part (28, 21; 38, 31, 32, 33) is defined by the beginning of the combustion process (B; B₁, B₂) or by the ignition process of the fuel.

6. The method according to any of the claims 1 through 5, wherein at least one limit of at least one cycle part (28, 21; 38, 31, 32, 33) is defined by the end of the combustion process (B; B₁, B₂).
7. The method according to any of the claims 1 through 6, wherein at least one cycle part (21; 31, 32 33) is defined by at least one combustion process (B; B₁, B₁₂, B₂).
8. The method according to any of the claims 1 through 7, wherein at least one cycle part is defined by the direction of motion of the piston (3).
9. The method according to any of the claims 1 through 8, wherein a limit of at least one cycle part is defined by the top or bottom dead center of the piston (3).
10. The method according to any of the claims 1 through 9, wherein at least one cycle part (28; 38) is defined by the compression process (C) of the gas enclosed in the cylinder (2).
11. The method according to any of the claims 1 through 10, wherein at least one cycle part (22; 34) is defined by the expansion process (E) of the gas enclosed in the cylinder (2).
12. The method according to any of the claims 1 through 11, wherein the computation of the computation variables of each cycle part (21 through 28; 31 through 38) is performed in real time.
13. The method according to any of the claims 1 through 12, wherein the operating status at the end of a cycle part (21 through 28; 31 through 38) is used as the initial condition for computing the next cycle part (21 through 28; 31 through 38).
14. The method according to any of the claims 1 through 13, wherein each operating status is defined by at least one variable selected from the group comprising torque, mass flow (m_{cyl}), in-cylinder charge condition of the

cylinders (2), energy content of the exhausts and wall heat flow (Q_{wall}) of at least one cylinder (2).

15. The method according to any of the claims 1 through 14, wherein at least one operating variable selected from the group comprising intake pressure (p_L), intake temperature (T_L) and gas composition in the suction pipe (12) is detected as an engine operating parameter.
16. The method according to any of the claims 1 through 15, wherein at least one operating variable selected from the group comprising exhaust pressure (p_A), exhaust temperature (T_A) and exhaust composition in the exhaust elbow is detected as an engine operating parameter.
17. The method according to any of the claims 1 through 16, wherein at least one parameter of the valve train mechanism, namely the timing of the intake and/or exhaust valves (7, 8) and/or the effective cross-sectional area of flow of the intake and/or exhaust valves (7, 8) is detected as an engine operating parameter.
18. The method according to any of the claims 1 through 17, wherein at least one parameter of combustion, namely the injection timing and/or ignition time and/or the amount of fuel injected is detected as an engine operating parameter.
19. The method according to any of the claims 1 through 18, wherein the engine speed (n) and/or the cylinder wall temperature (T_w) is determined as an engine operating parameter.
20. The method according to any of the claims 1 through 19, wherein at least one engine operating parameter is analytically determined.
21. The method according to any of the claims 1 through 20, wherein at least one engine operating parameter is determined by measurement.

22. The method according to claim 20 or 21, wherein at least one engine operating parameter is determined analytically and by measurement and that computed and measured values are aligned.
23. The method according to claim 22, wherein at least one engine operating parameter selected from the group comprising mass flow (m_{cyl}), cylinder pressure (p_{cyl}), air-fuel ratio and torque are determined analytically and by measurement.
24. The method according to claim 17, wherein the effective cross sectional areas of flow of the intake and/or exhaust valves (7, 8) are approximated by a rectangular or stepped curve.
25. The method according to claim 17 or 24, wherein the effective cross sectional areas of flow of the intake and/or exhaust valves (7, 8) are approximated by a mean cross-sectional area of flow.
26. The method according to any of the claims 1 through 25, wherein, for deducing the equations (7, 10) for the computation variables, the effective piston speed is approximated by a mean piston speed in at least one cycle part.
27. The method according to claim 26, wherein the error resulting from the assumption of the mean piston speed is compensated resolving the equations (7, 10) of the computation variables.